Maryland School Assessment

Science

2007 Public Release

Grade 8

Acknowledgements:

A Sea Wall Just Molecule High

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New 'Time Machine' From Ice

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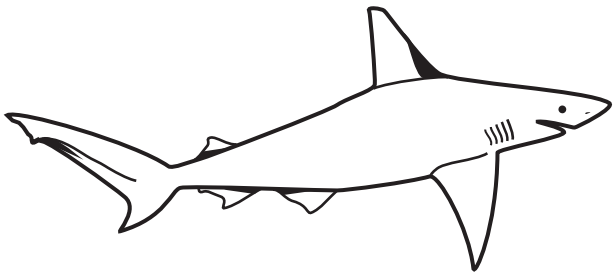
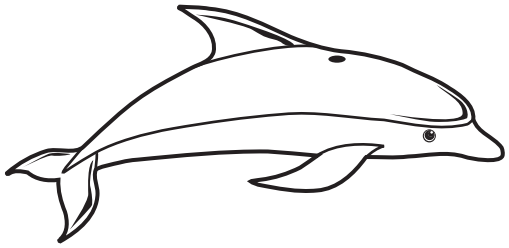
Session 1

1 **The sandbar shark and the bottlenose dolphin pictured below live in water. Though the animals look similar, the shark is classified as a fish and the dolphin is classified as a mammal.**



Sandbar shark



Bottlenose dolphin

Which statement best supports classifying the shark as a fish and the dolphin as a mammal?

- ○ **A** One gets energy from sunlight; the other gets energy from food.
- ○ **B** One has several fins on the belly; the other has no fins on the belly.
- ○ **C** One breathes using gills; the other breathes through a blowhole and lungs.
- ○ **D** One has eyes on the front of the head; the other has eyes on the side of the head.

2 **The table below compares the average daily temperatures during the month of July in two cities. Both cities are along the Atlantic Ocean. Baltimore, Maryland, is in the Northern Hemisphere, and Buenos Aires, Argentina, is in the Southern Hemisphere.**

City	Average Temperature in July
Baltimore, Maryland	33°C
Buenos Aires, Argentina	11°C

Which statement best explains why Baltimore is warmer in July?

- ○ **A** Ocean waves keep Baltimore warmer in July.
- ○ **B** There are fewer hours of daylight in Baltimore in July.
- ○ **C** The Northern Hemisphere is tilted toward the sun in July.
- ○ **D** The Southern Hemisphere is tilted toward the sun in July.

3 **Logging companies cut trees in a forest and send the trees to lumber mills far from the forest. The mills make boards that are used for construction. Some logging companies do not plant tree seedlings after cutting trees.**

Not planting tree seedlings might affect people who need boards in the future because

- ○ **A** the price of boards will increase
- ○ **B** the price of boards will decrease
- ○ **C** there will be more boards available
- ○ **D** there will be more trees for logging

Directions

Use The Periodic Table of the Elements and the information below to answer Numbers 4 through 6.

Magnesium metal (Mg) is grayish-white in color and reacts actively with water. Fluorine (F_2) is a greenish-yellow gas at room temperature and is a member of the halogen family. These two elements react to produce magnesium fluoride (MgF_2), a chemical commonly used in making windows and lenses.

4 **According to the Periodic Table of the Elements, which element is <u>most</u> similar to magnesium (Mg)?**

- ○ **A** calcium (Ca)
- ○ **B** iodine (I)
- ○ **C** sodium (Na)
- ○ **D** sulfur (S)

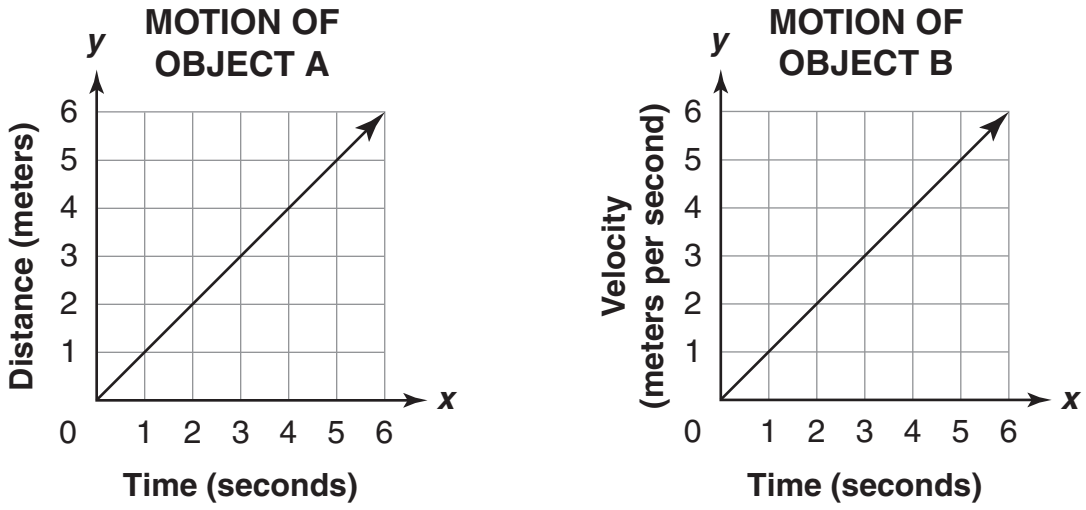
5 **How do the elements magnesium (Mg) and fluorine (F_2) produce the compound magnesium fluoride (MgF_2)?**

- ○ **A** by nuclear connection
- ○ **B** by physically combining
- ○ **C** by magnetic connection
- ○ **D** by chemically combining

6 **How does adding heat energy affect magnesium fluoride (MgF_2) molecules ?**

- ○ **A** The motion of the molecules stops.
- ○ **B** The motion of the molecules increases.
- ○ **C** The motion of the molecules decreases.
- ○ **D** The motion of the molecules is at a constant rate.

7 **The graphs below represent the motion of two objects, A and B.**



Describe the types of motion represented by the two graphs. In your description, be sure to include

- **the type of motion represented by each graph**
- **the difference between the two types of motion**

Write your answer in the space provided.

Object A Graph

Object B Graph

Directions

Use the information below to answer Numbers 8 through 10.

The map below shows the geographic relationship between two cities in the United States. Cleveland, Ohio is approximately 600 kilometers northwest of Baltimore, Maryland.

The data below represents the weather conditions on a specific Monday in Cleveland, Ohio and Baltimore, Maryland.

Weather Condition	Cleveland	Baltimore
Temperature	7°C (45°F)	25°C (77°F)
Winds	From NW, 40 kilometers per hour	From SW, 8 kilometers per hour
Air pressure	1,008 millibars, stable	1,015 millibars, falling
Precipitation	Heavy rains	None
Cloud cover	Cloudy	Clear

Average air pressure = 1,013 millibars

8 **On this Monday, the weather in Cleveland is influenced by a**

- **A** tornado
- **B** blizzard
- **C** low pressure area
- **D** high pressure area

9 **A weather forecaster in Baltimore said, "There will be increasing clouds in Baltimore late Monday night."**

Which statement about the Monday weather best supports this prediction?

- **A** In Cleveland, clouds are clearing.
- **B** In Baltimore, the air pressure is falling.
- **C** In Cleveland, the air pressure is stable.
- **D** In Baltimore, there is a moderate breeze from the southwest.

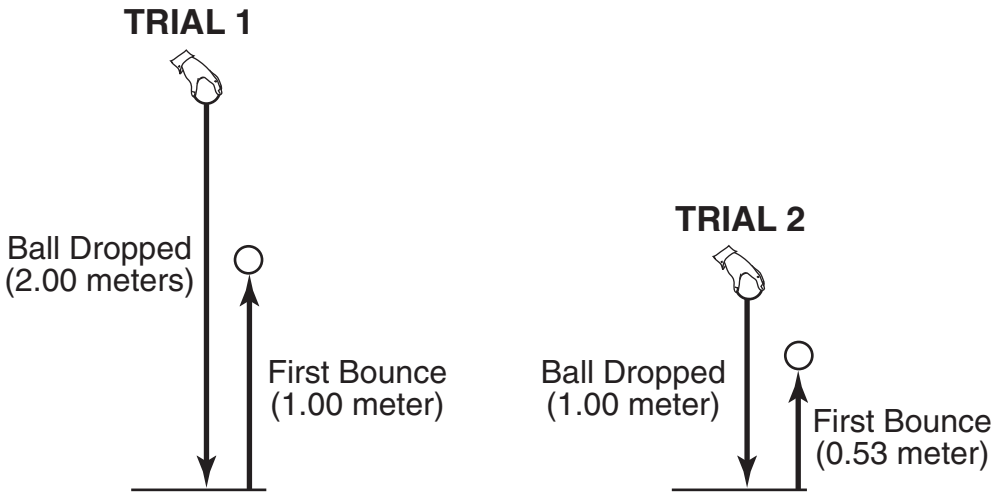
10 **Which description best represents a high pressure system in the northern hemisphere?**

- **A** winds flowing outward and counterclockwise
- **B** winds flowing inward and counterclockwise
- **C** winds flowing outward and clockwise
- **D** winds flowing inward and clockwise

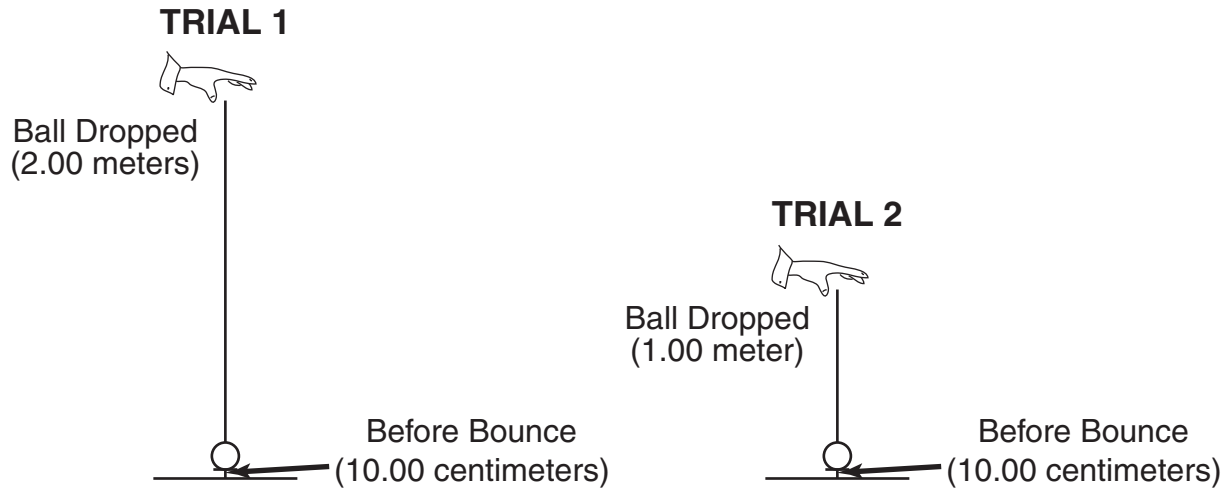
Directions

Use the information below to answer Numbers 11 through 13.

Students dropped a tennis ball from heights of 2.00 meters and 1.00 meter. The students compared the heights of the ball after the first bounce of each drop.



11 **The diagrams below show the tennis ball after release and 10.00 centimeters before bouncing.**



Which statement best describes the motion of the tennis ball 10.00 centimeters before bouncing in each trial?

- ○ **A** The speed and position of the tennis ball is the same in both trials.
- ○ **B** The speed and direction of the tennis ball is the same in both trials.
- ○ **C** The velocity and position of the tennis ball is the same in both trials.
- ○ **D** The direction and position of the tennis ball is the same in both trials.

12 **The motion of the tennis ball as it falls is best described as**

- **A** accelerated motion
- **B** constant motion
- **C** periodic motion
- **D** uniform motion

13 **Students recorded the findings from Trial 1 and Trial 2 in the data table below.**

TENNIS BALL HEIGHTS

Drop Heights (meters)	First Bounce Height (meters)
2.00	1.00
1.00	0.53

Which mathematical operation can be used to calculate the ratio between the Drop Height (*DH*) and the First Bounce Height (*BH*)?

- **A** $DH \div BH$
- **B** $DH - BH$
- **C** $BH \times DH$
- **D** $DH + BH$

14 **The picture below shows four leaves, each from a different tree.**

Poplar Pine Maple Oak

Which leaf is <u>best</u> adapted to a dry environment?

- ○ **A** poplar
- ○ **B** pine
- ○ **C** maple
- ○ **D** oak

15 **Human actions affect the environment.**

Which human action affects the <u>smallest</u> area of the environment?

- ○ **A** burning a forest
- ○ **B** burning fossil fuels
- ○ **C** digging a new landfill
- ○ **D** spraying crops with chemicals

16 **Scientists perform experiments to test hypotheses.**

How do scientists try to remain objective during experiments?

- ○ **A** Scientists analyze all results.
- ○ **B** Scientists use safety precautions.
- ○ **C** Scientists conduct experiments once.
- ○ **D** Scientists change at least two variables.

Session **2**

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17 **A student has one liter of feathers and one liter of iron nails.**

Which statement best compares the masses of the two samples?

- ○ **A** The masses cannot be compared without a balance.
- ○ **B** The mass of the feathers is less than the mass of the nails.
- ○ **C** The mass of the feathers is the same as the mass of the nails.
- ○ **D** The mass of the feathers is greater than the mass of the nails.

18 **Many processes on Earth occur at or near tectonic plate boundaries.**

Which geological events are most common along tectonic plate boundaries?

- ○ **A** erosion and deposition
- ○ **B** hurricanes and tornadoes
- ○ **C** earthquakes and volcanoes
- ○ **D** tidal waves and sedimentation

19 **A toy car rolls at a constant speed down a straight inclined track. When the car reaches the flat surface at the base of the inclined track, the speed of the car decreases.**

Which statement best explains why the speed of the car decreases when it reaches the flat surface?

- ○ **A** The force of gravity acting on the car increases.
- ○ **B** The force of gravity acting on the car decreases.
- ○ **C** The forces influencing the car are not balanced.
- ○ **D** The forces influencing the car are balanced.

Directions

Use the technical passage below to answer Numbers 20 through 21.

A Sea Wall Just One Molecule High

"There was a large pond, very rough with wind. I dropped a little oil on the water. Though not more than a teaspoonful, it produced an instant calm, [making the water] as smooth as a looking glass."

An incredible experiment, but even more so because of who performed it–Benjamin Franklin, in 1762! Aside from his political influence, Franklin was one of his day's greatest scientists. Did the inventor of the lightning rod also discover a way to calm waves?

In a way, yes. Oil films can be extremely thin–in places, just one molecule high. So how can a barrier that shallow stop waves? One secret is in the molecules. Molecules of oil lack the bond strength found in water. Because of oil's weaker bonds, wind can't push it nearly as well. So oily water produces smaller waves.

In fact, you can prove this idea yourself. Set some thread on a cup of water. Instead of sinking, it floats on the surface, because water's strong bonds form a kind of "sheet." Then set a similar thread on a cup of oil. It sinks. Oil's bonds are too weak.

In olden days, sailors used oil-soaked rags to calm the water around their ship. Sadly, today, the ocean is often calm where oil tankers have accidentally leaked their cargo into the sea.

Of course, making giant oil spills is not a responsible way to control ocean waves. However, researchers at the University of California at Berkeley may have discovered an amazing piece of Franklin's puzzle. We usually think of oil as slippery. However, the whirling mist of droplets that rises off ocean waves is even slicker. Wave spray is so slick that it lets wind blow over the water until it reaches hurricane speed. And that makes the waves even bigger.

In theory, a film of oil on the water might reduce this wave spray, slowing the wind and calming the waves. There are harmless oils available that would break down naturally. The approach might not work in an actual storm, with so much water to cover. Still, it reveals some intriguing new wave science–that's really centuries old!

20 **Students investigated producing waves on the surface of the water in a container. The students filled four identical containers with the same amount of water. Five milliliters of oil was then added to three of the four containers. An electric fan was used to produce wind across the surface of the water in each container. The fan had four speeds; 1 was the slowest speed and 4 was the fastest.**

Container	Type of Oil	Fan Speed
L	None	1
M	Canola	2
N	Corn	3
O	Olive	4

Which statement best describes an error the students made in this investigation?

- ○ **A** The students did not use a control.
- ○ **B** The students changed more than one variable.
- ○ **C** The students used the same amount of water.
- ○ **D** The students used an electric fan instead of natural wind.

21 **Ocean tides are a possible source of renewable energy.**

What device would most likely be used to convert tidal energy into electrical energy?

- ○ **A** a turbine
- ○ **B** an engine
- ○ **C** a windmill
- ○ **D** a solar cell

Use the data table below to answer Number 22.

PROPERTIES OF HYDROGEN, OXYGEN, CARBON, AND OIL

Element in Oil	State of Matter at Room Temperature	Color	Reaction with Oxygen
Hydrogen	Gas	No color	Produces energy and water
Oxygen	Gas	No color	No reaction
Carbon	Solid	Black, gray, or clear (depending on form)	Produces carbon dioxide and/or carbon monoxide
Compound	**State of Matter at Room Temperature**	**Color**	**Reaction with Oxygen**
Oil	Liquid	Slightly yellow to black	Produces energy, water, carbon dioxide, and/or carbon monoxide

22 **Compare the properties of oil to the properties of the elements in oil. In your comparison, be sure to include**

- **the properties of oil**
- **the properties of the elements in oil**
- **the motion of the molecules in oil, carbon, and hydrogen**

Write your answer in the space provided.

23 **The motion of a car accelerating in a straight line differs from the motion of a car moving in a straight line at a constant speed.**

Which change best describes acceleration of a car?

- ○ **A** a change in the direction of the car
- ○ **B** a change in the distance the car travels
- ○ **C** the change in velocity divided by the time for that change
- ○ **D** the change in the time for the car to travel a distance

24 **When 1 gram of water is evaporated, the volume of the water vapor increases but the mass remains constant.**

Why does the mass of the water remain constant?

- ○ **A** The temperature of the water remains constant.
- ○ **B** The pressure acting on the water remains constant.
- ○ **C** The number of atoms in the water remains constant.
- ○ **D** The distance between water molecules remains constant.

25 **As humans grow, their bodies change.**

Which of these statements explains how humans grow?

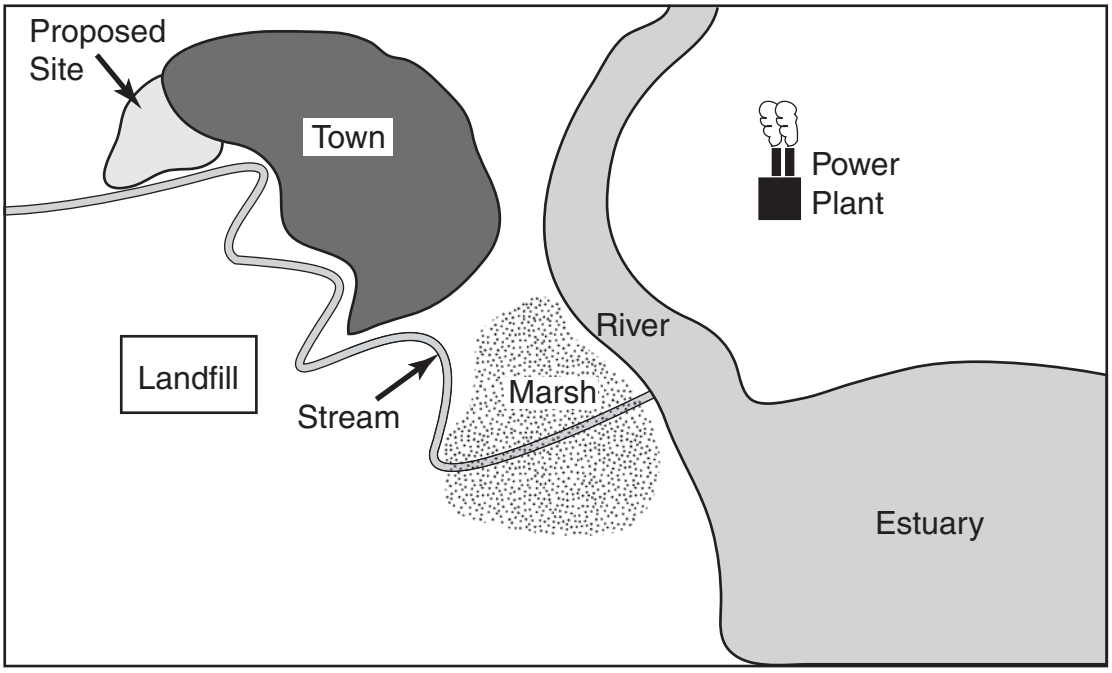
- ○ **A** Cells form a cell wall.
- ○ **B** Cells increase in size.
- ○ **C** Cells undergo cell division.
- ○ **D** Cells merge to become larger.

Directions

Use the information and the map below to answer Numbers 26 through 28.

The map shows a site for a proposed housing development near a town. A wastewater treatment plant for the housing area will be built along the stream, between the proposed development and the landfill. The stream flows through a saltwater marsh and into a river. The river empties into an estuary, similar to the Chesapeake Bay.

MAP SHOWING PROPOSED SITE FOR NEW HOUSING DEVELOPMENT



26 **Natural processes have been eroding the stream banks near the proposed housing development site.**

How will the housing development most likely affect the stream banks?

- ○ **A** Decreased runoff from the development will increase the erosion of the stream banks.
- ○ **B** Decreased runoff from the development will stop the erosion of the stream banks.
- ○ **C** Increased runoff from the development will increase the erosion of the stream banks.
- ○ **D** Increased runoff from the development will decrease the erosion of the stream banks.

27 **Which outcome will most likely have a positive effect on the environment of the town downstream from the proposed development?**

- ○ **A** increased traffic on local roads
- ○ **B** decreased marsh land for marsh organisms
- ○ **C** decreased land devoted for human recreation
- ○ **D** increased awareness of human impact on the area

28 **Which of these solutions best describes how to reduce the negative environmental effects of the proposed development?**

- ○ **A** Develop wetlands to absorb chemicals in the runoff.
- ○ **B** Plant larger lawns around houses in the development.
- ○ **C** Build concrete drainage streams to help water flow faster.
- ○ **D** Construct several small roads instead of a few large ones.

29 **Scientists use models that show the features of an atom.**

A scientist should use a model that

- ○ **A** was the first to be developed
- ○ **B** was most recently developed
- ○ **C** shows the arrangement most clearly
- ○ **D** shows the details needed for a specific purpose

30 **As the human population grows, the demand for natural resources increases.**

Which activity wastes a natural resource?

- ○ **A** turning off lights
- ○ **B** using public transportation
- ○ **C** throwing away aluminum cans
- ○ **D** opening windows to cool a house

31 **During sexual reproduction one sperm cell unites with one egg cell to produce a fertilized egg that develops into a new organism.**

Which of the following statements best describes how an offspring receives genetic information from its parents?

- ○ **A** The offspring receives half of its genes from each parent.
- ○ **B** The offspring receives all the genes from each parent.
- ○ **C** The offspring receives more genes from the male parent than from the female parent.
- ○ **D** The offspring receives more genes from the female parent than from the male parent.

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Session **3**

Directions

Use the information below to answer Numbers 32 through 34.

Bald eagles are found in and near desert, mountain, freshwater, and marine environments throughout the United States. Bald eagles build huge nests that are usually in treetops, near areas of water. The main food source for bald eagles is fish, but the birds sometimes eat other small animals. In 1967, the bald eagle was listed as an endangered species by the Environmental Protection Agency. The widespread use of DDT was responsible for the decline in the number of eagles. DDT, a chemical commonly used to control mosquitoes, caused thinning of the eagle egg shells.

The data table below shows how the population of breeding pairs of bald eagles has changed over a 12-year period in several states.

BREEDING PAIRS OF BALD EAGLES BY STATE

State	Year 1	Year 3	Year 6	Year 9	Year 12
Maryland	123	154	201	260	319
Massachusetts	5	9	10	11	12
Michigan	174	246	287	334	405
Nebraska	0	2	10	13	29
Nevada	0	0	0	2	1

32 **Which statement is the most likely reason for the large difference in the number of breeding pairs in Maryland and Nevada?**

- **A** There are fewer trees in Maryland.
- **B** There are more fish in Nevada.
- **C** There are more open waters in Maryland.
- **D** There are fewer small animals in Nevada.

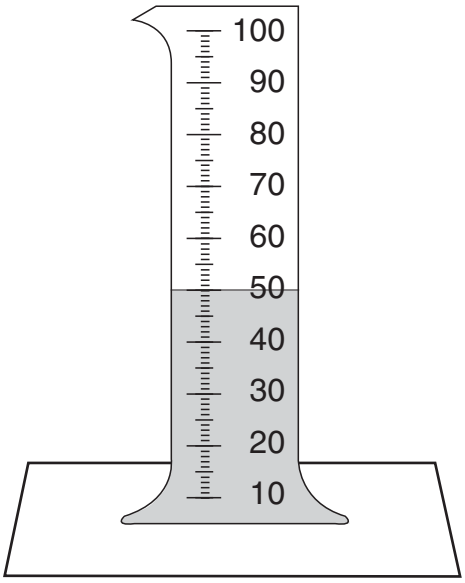
33 **Which statement best explains why habitats in Michigan and Maryland support more breeding pairs than habitats in other states?**

- **A** Cropland provides grain for food.
- **B** Large lakes and rivers provide food.
- **C** Mountains provide fewer places to hunt.
- **D** Grasslands provide homes for large animals.

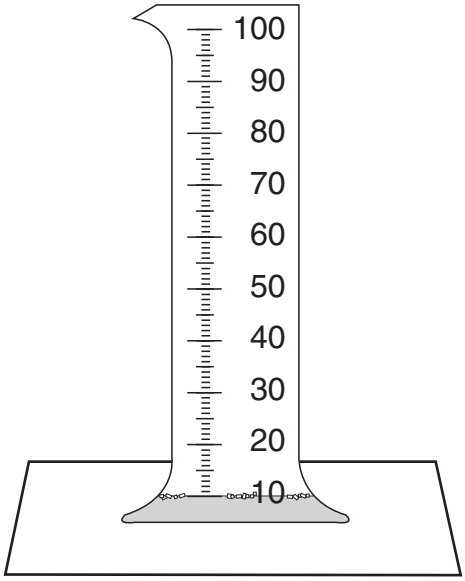
34 **In which year did all states show an increase in the number of breeding pairs?**

- **A** Year 3
- **B** Year 6
- **C** Year 9
- **D** Year 12

35 **Mixtures may be separated into individual substances in a variety of ways. The graduated cylinder on Day One contains a mixture of salt and water. The graduated cylinder is left undisturbed for two days.**



Day One



Day Three

By Day Three, a solid has formed at the bottom of the graduated cylinder. The solid is a single substance.

What process was used to separate the mixture?

- ○ **A** sifting
- ○ **B** filtration
- ○ **C** evaporation
- ○ **D** paper chromatography

Use the chemical equation below to answer Number 36.

$$\text{carbon dioxide + water} \xrightarrow{\text{sunlight}} \text{sugar + oxygen}$$

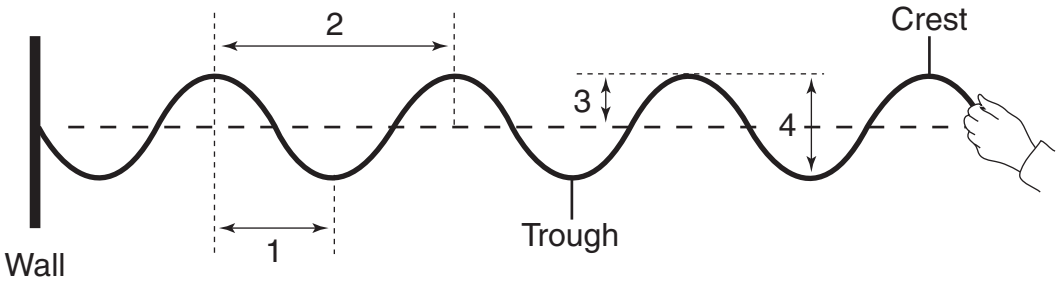
36 **What process is represented by the chemical equation above?**

- **A** how plants make food
- **B** how plants digest food
- **C** how animals make food
- **D** how animals digest food

Directions

Use the diagram below to answer Numbers 37 through 39.

A student produces a series of waves, as shown below.



37 **Which number in the diagram represents a wavelength?**

- **A** 1
- **B** 2
- **C** 3
- **D** 4

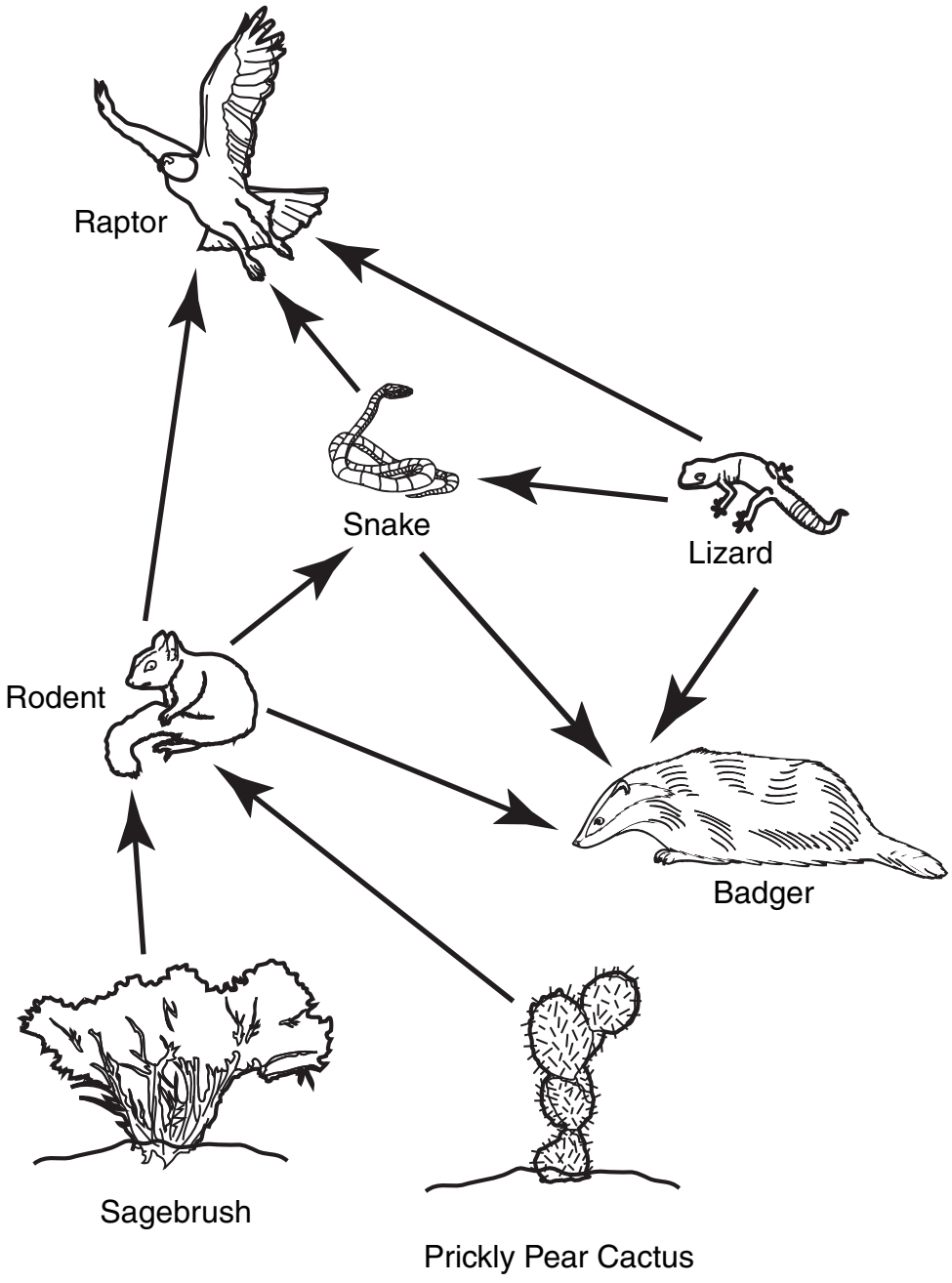
38 **Which of the following changes in wave properties is a result of an increase in wavelength?**

- ○ **A** higher crests
- ○ **B** reduced height
- ○ **C** lower frequency
- ○ **D** faster movement

39 **Which change in wave properties increases wave amplitude?**

- ○ **A** greater length
- ○ **B** increased height
- ○ **C** decreased frequency
- ○ **D** shortened wavelength

40 **The diagram shows the relationships among organisms in an ecosystem.**



Explain how organisms in this ecosystem compete for resources. In your explanation, be sure to include

- **the animals that compete for the same food source**
- **why the plants and animals compete for water**

Write your answer in the space provided.

41 **The data table below includes information about how temperature affects the state of matter for three substances.**

HOW TEMPERATURE AFFECTS STATES OF MATTER

Substances	State of Matter at Room Temperature (22°C)	State of Matter when Heated
Butter	Solid	Liquid (29°C)
Sugar	Solid	Liquid (186°C)
Water	Liquid	Gas (100°C)

The information in the table indicates that

- ○ **A** the atoms in matter slow when heated
- ○ **B** temperature physically changes matter
- ○ **C** temperature chemically changes matter
- ○ **D** the atoms in matter change shape when heated

42 **Thunderstorms and hurricanes are examples of severe weather.**

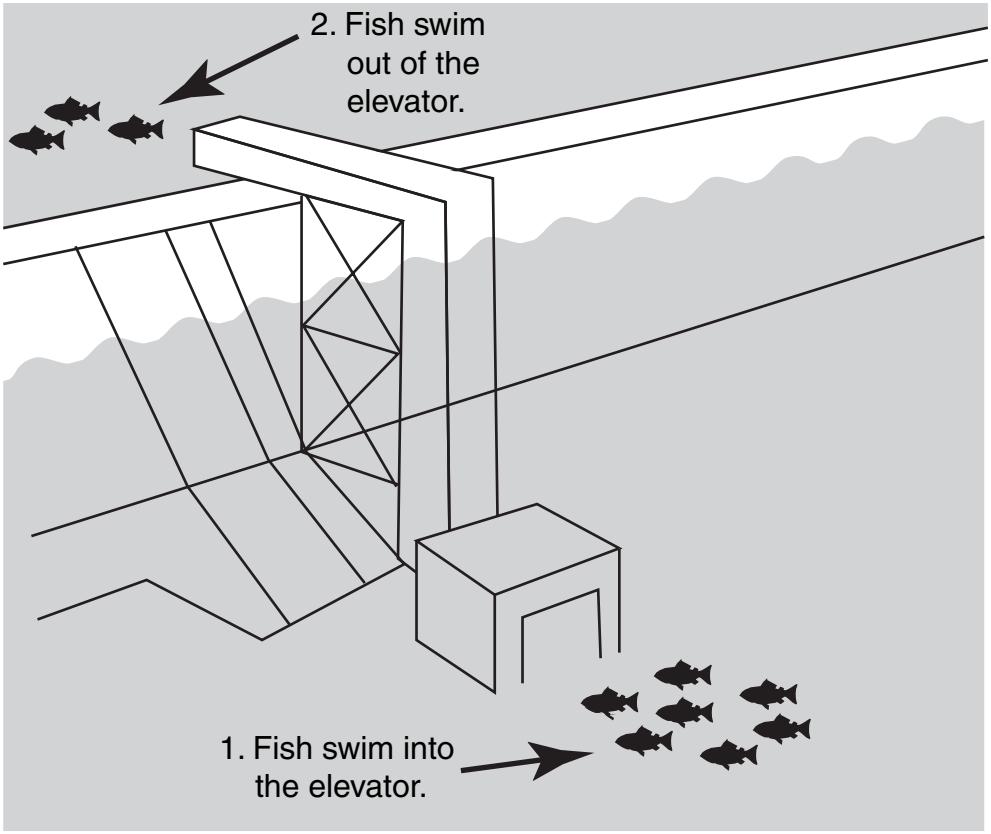
Which of these weather conditions is necessary for the formation of thunderstorms and hurricanes?

- ○ **A** a cold rain falling to the ground
- ○ **B** air masses combining to create a high-pressure area
- ○ **C** winds spiraling downward and away from the center of a storm
- ○ **D** air moving toward the center of a storm and rising into the atmosphere

Directions

Use the information and the diagram below to answer Numbers 43 through 45.

Hydroelectric dams use falling water to generate electricity. Dams affect river organisms, including the American shad, a common fish in waterways. Shad live in the ocean but swim up rivers to reproduce (spawn). Engineers have built elevators on dams for the shad and other fish. The fish swim into the elevator below the dam and are raised into the water above the dam.



43 **Which human activity would most likely reduce the shad population?**

- **A** preserving wetlands along the spawning areas
- **B** spilling chemical waste into the spawning areas
- **C** monitoring water conditions of the spawning areas
- **D** conducting fish-tagging programs within the spawning areas

44 **Over-fishing of shad has contributed to a decline in the shad population.**

Which fishing practice would most likely result in an increase in the shad population?

- **A** The amount of shad caught is equal to the number of shad born.
- **B** The amount of shad caught is less than the number of shad born.
- **C** The amount of shad caught is equal to the demand from humans.
- **D** The amount of shad caught is greater than the demand from humans.

45 **What might be a likely consequence of dams to the environment downriver?**

- **A** reduced pollution
- **B** increased flooding
- **C** reduced fish populations
- **D** increased drinking water

46 **When sodium metal reacts with chlorine gas, sodium chloride (table salt) forms. The data table below shows information about sodium, chlorine, and sodium chloride.**

PROPERTIES OF SODIUM, CHLORINE, AND SODIUM CHLORIDE

Substance	Physical Appearance	Boiling Point (°C)	Change When Added to Water
Sodium (Na)	Shiny, soft, solid metal	883	Forms new compound
Chlorine (Cl)	Greenish gas	−34	Forms new compound
Sodium chloride (NaCl)	White crystals	1,465	Dissolves in water

Which statement best describes the properties of sodium, chlorine, and sodium chloride?

- ○ **A** All have similar chemical and physical properties.
- ○ **B** All have different chemical and physical properties.
- ○ **C** All have similar physical properties but different chemical properties.
- ○ **D** All have similar chemical properties but different physical properties.

47 **A doorbell contains a simple electromagnet.**

Which change would most likely increase the strength of an electromagnet?

- ○ **A** longer wires
- ○ **B** fewer wire coils
- ○ **C** an aluminum core
- ○ **D** a larger power source

48 **Substances are classified as acidic, basic, or neutral. The pH scale can be used to classify a substance.**

pH LEVELS OF VARIOUS SUBSTANCES

Substances	pH	Acidic, Basic, Neutral
Lemon juice	2.0	Acidic
Vinegar	2.2	Acidic
Milk	6.6	Acidic
Pure water	7.0	Neutral
Baking soda	8.3	Basic
Ammonia	11.0	Basic
Sodium hydroxide	14.0	Basic

Which feature suggests that a substance is basic?

- ○ **A** The pH is 0.
- ○ **B** The pH is 7.
- ○ **C** The pH is less than 7.
- ○ **D** The pH is greater than 7.

Session **4**

Directions

Use the technical passage below to answer Numbers 49 through 51.

New 'Time Machine' from Ice

Thanks to air bubbles trapped in a long cylinder of ice from a glacier in Antarctica, scientists have jumped an extra 210,000 years back in time. This scientific "time machine" now tells us how much carbon dioxide and methane was in the air as far back as 650,000 years ago.

Carbon dioxide and methane are two important greenhouse gasses that trap heat and can contribute to global warming.

The full name of the ancient tube of ice is the "EPICA Dome C ice core." It contains hundreds of thousands of years of air samples within tiny bubbles trapped in the ice. The air bubbles form when snowflakes fall. Each bubble contains a record of how much carbon dioxide and methane was in that air at a specific time in the past.

Today's rising level of carbon dioxide in the atmosphere is already 27 percent higher than its highest recorded level during the last 650,000 years, said Science author Thomas Stocker of the Physics Institute of the University of Bern, in Bern, Switzerland.

Stocker explained that this research adds another piece of information showing that humans have changed the concentrations of some gasses in the air much faster than these gas levels have changed in the more distant past.

The scientists compared the new record of carbon dioxide and methane from 390,000 to 650,000 years ago to the history of Antarctic temperature for the same time period. This comparison confirms previous reports of a steady relationship between Antarctic climate and carbon dioxide and methane during the last four ice ages and the warm periods in between the ice ages. The new ice core research also extends this steady relationship back another 210,000 years (two ice ages and two warm periods).

Knowing how long the greenhouse gasses and Antarctic climate have been "going steady" may help scientists predict how the climate will change in the future, the scientists say.

Discovering the history of gasses in the air is also useful for trying to answer all sorts of other questions, like, when did humans start changing the levels of gasses in Earth's atmosphere? And, how long might our current warm period last?

49 **How do humans contribute most to an increase in greenhouse gases in the atmosphere?**

- ○ **A** Public transportation is used in larger cities.
- ○ **B** Trees are planted when forests are harvested.
- ○ **C** Carbon dioxide is expelled when people breathe.
- ○ **D** Fossil fuels are burned as a source of energy.

50 **How would an increased carbon dioxide level, caused by humans, most likely affect Earth?**

- ○ **A** There would be more incoming sunlight.
- ○ **B** There would be more oxygen in the atmosphere.
- ○ **C** There would be a loss of many current environments.
- ○ **D** There would be a decrease in the number of earthquakes.

51 **How would an increase in greenhouse gases most likely affect coastal areas?**

- ○ **A** Precipitation would decrease.
- ○ **B** The sea level would increase.
- ○ **C** Salt content of the ocean would increase.
- ○ **D** The number of hurricanes would decrease.

52 **Roses produced asexually from cuttings are genetically identical to the parent. Roses grown from sexually produced seeds may look different from either parent.**

Which statement is best supported by this information?

- ○ **A** Sexually produced plants are a new species.
- ○ **B** Sexual reproduction produces more variation in plants.
- ○ **C** Asexually produced plants are larger than sexually produced plants.
- ○ **D** Asexual reproduction helps plants adapt to different environments.

53 **Scientists conduct investigations to answer questions.**

Before making a valid conclusion, scientists must

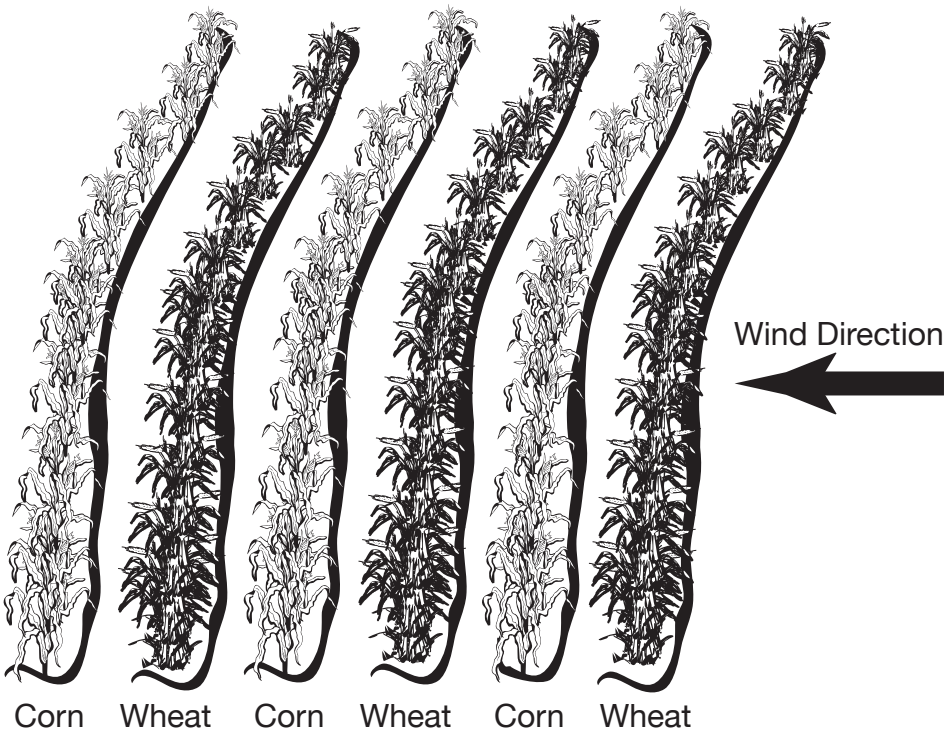
- ○ **A** collect relevant evidence
- ○ **B** tell people about the data
- ○ **C** publish results from the investigation
- ○ **D** discuss the investigation with other scientists

54 **When Chemical X is added to a certain liquid, the chemical breaks into Substances Y and Z. It is not possible to break Substances Y and Z into simpler particles.**

Which statement is best supported by this evidence?

- ○ **A** Chemical X is an element.
- ○ **B** Chemical X is soluble in water.
- ○ **C** Substances Y and Z are elements.
- ○ **D** Substances Y and Z are compounds.

55 **Strip cropping is a method of farming that plants two types of crops at the same time. The crops are planted in alternating sections across the slope of a field or at a right angle to the prevailing winds.**



Why do farmers <u>most likely</u> use strip cropping?

- ○ **A** to provide shelter for animals
- ○ **B** to protect the soil from erosion
- ○ **C** to protect the crops from weeds
- ○ **D** to provide different types of food

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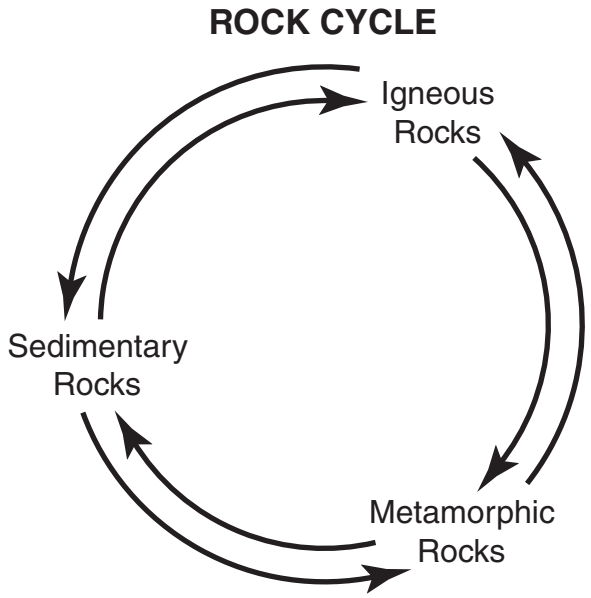
Directions

Use the information below to answer Numbers 56 through 58.

The rock cycle is a process that alters sedimentary, metamorphic, and igneous rocks. The diagram below shows the rock cycle.



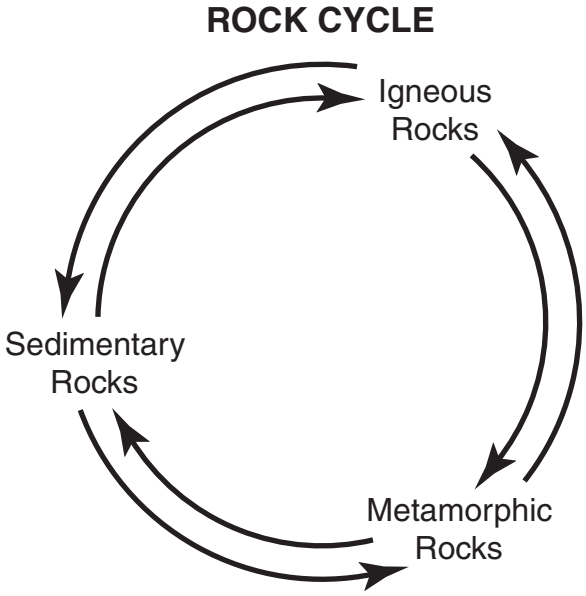
56 **Which process forms igneous rock?**

- **A** weathering of rock
- **B** cooling of liquid magma
- **C** heat and pressure changing solid rock
- **D** compaction and cementation of loose material

57 **Which type of rock contains the best fossil record?**

- **A** igneous
- **B** magma
- **C** metamorphic
- **D** sedimentary

58 **Igneous, metamorphic, and sedimentary rock are all part of the rock cycle.**

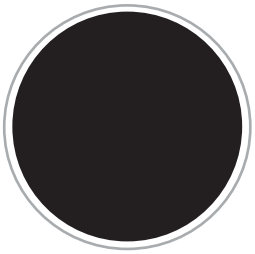


Explain how metamorphic rocks are part of the rock cycle. In your explanation, be sure to include

- **the features that make each rock type different**
- **the processes that result in the formation of each rock type**

Write your answer in the space provided.

59 **A new moon, as viewed from Earth, is diagrammed below.**



New Moon

Which statement <u>best</u> describes how a new moon occurs?

- ○ **A** Earth receives no sunlight.
- ○ **B** The moon receives no sunlight.
- ○ **C** Earth is between the moon and the sun.
- ○ **D** The moon is between Earth and the sun.

60 **A puppy has traits from its mother and its father.**

Which of these structures provides genetic information from the father to the puppy?

- ○ **A** a muscle cell
- ○ **B** a nerve cell
- ○ **C** a blood cell
- ○ **D** a sperm cell

61 **A teacher asks her students the following question: How does the air pressure inside a soccer ball affect the distance the soccer ball travels after the ball is kicked?**

Which statement below is the best hypothesis for this investigation?

- ○ **A** If a soccer ball is large, then the soccer ball will travel a farther distance than a small soccer ball.
- ○ **B** If a soccer ball has a high internal air pressure, then the ball will travel a farther distance than a soccer ball with less internal air pressure.
- ○ **C** If a soccer ball travels a distance of 15 meters, then the ball is traveling faster than a soccer ball that travels a distance of 20 meters.
- ○ **D** If a soccer ball has 0.5 atmospheres of internal pressure, then the ball will travel slower than a ball with 0.8 atmospheres of internal pressure.

Directions

Use the information below to answer Numbers 62 through 64.

During an investigation, students were given chemical data for several common household products, as shown in the data table below. Students were to determine if a substance was an acid or base by using litmus paper. Litmus paper turns red in an acid and turns blue in a base.

Substance	Color of Solution	Melting Point (°C)	Boiling Point (°C)	Soluble in Water	Odor	Litmus Paper Test
Carpet cleaner	Clear	0	100	Yes	Weak	Blue
Vinegar	Clear	−2	118	Yes	Strong	Red
Oven cleaner	Clear	−1	93	Yes	Weak	Blue
Bleach	Clear, light yellow	0	100	Yes	Strong	Blue

62 **Which physical property best classifies vinegar in a separate group of substances from oven cleaner?**

- ○ **A** boiling point
- ○ **B** melting point
- ○ **C** color of solution
- ○ **D** solubility in water

63 **Which conclusion is supported by the data from the investigation?**

- **A** Many cleaning supplies are soluble in water.
- **B** Cleaning solutions with a weak odor are acids.
- **C** Water is the main ingredient in many cleaning supplies.
- **D** A substance changes from a gas to a liquid as the temperature of the substance increases.

64 **Which statement describes the motion of the molecules within the carpet cleaner when enough heat energy is added to boil the carpet cleaner?**

- **A** The molecules stop moving.
- **B** The molecules move more slowly.
- **C** The molecules move more quickly.
- **D** The molecules begin moving at a constant rate.